

*Stated Meeting, December 2, 1864.*

Present, twenty-six members.

Judge SHARSWOOD, Vice-President, in the Chair.

Mr. Hilgard, Mr. Harrison, Mr. Joseph Lesley and President Smith, of Girard College, were introduced to the presiding officer, and took their seats as members. Captain Goodman, of the New Hampshire Historical Society, and Mr. L. Thurlow, of Wilkesbarre, were also introduced.

A letter addressed to the President by a claimant for the Magellanic Premium, but without the required sealed packet, accompanying the claim, was read, and on motion, laid on the table. It described an invention for the safety of passengers at sea, and was illustrated by a model.

A letter accepting membership was received from Mr. R. H. Lamborn, dated Altoona, November 17th, 1864.

Donations for the Library were received from the New Hampshire Historical Society; the Franklin Institute; Captain Goodman, and Mr. Lamborn.

The death of the Hon. Roger B. Taney, Chief Justice of the United States, a member of this Society, on the 12th day of October, 1864, aged 87 years, was announced by the Secretary, and on motion, Judge Sharswood was appointed to write an obituary notice of the deceased.

The death of Professor Benjamin Silliman, a member of this Society, at New Haven, November 25th, 1864, aged eighty-four years, was announced by the Secretary, and Professor Pierce appointed to prepare an obituary notice of the deceased.

A photograph and description of the Great Pittsburg Gun, now mounted at Fort Hamilton, was communicated by Mr. Lamborn, with the following letter from Mr. Charles Knap, dated Fort Pitt Foundry, Pittsburg, November 4th, 1864.

The idea of a twenty inch gun was conceived by Major T. J. Rodman, of the Army Ordnance Corps, and the gun in question was designed by him, and made after his method of "Hollow Casting." It required for its manufacture, new furnaces, cranes and lathes, full

descriptions of which were given in the *Philadelphia Press*, of February 12th or 13th, 1864.

The gun was cast on February 11th, 1864, from three large furnaces, containing 80 tons of iron. It was cast hollow, and cooled by means of a stream of cold air forced through the bore from an ordinary fan. Air was preferred to the usual stream of water, on account of the great size of the mass, which increased the danger of creating a dangerous amount of shrinkage. The second twenty inch gun, however, made for the Navy, was cooled by water, without injury.

The cooling occupied two weeks.

The principal weights and dimensions of the gun are as follows, viz. :

|                                         |           |                    |
|-----------------------------------------|-----------|--------------------|
| Rough weight,                           | . . . . . | 160,000 pounds.    |
| “ length,                               | . . . . . | 25 feet, 8 inches. |
| “ maximum diameter,                     | . . . . . | 66 “               |
| “ minimum “                             | . . . . . | 48 “               |
| “ diameter of bore,                     | . . . . . | 19 “               |
| Finished weight,                        | . . . . . | 116,497 pounds.    |
| “ extreme length,                       | . . . . . | 20 feet, 3 inches. |
| “ “ “ of bore,                          | . . . . . | 210 “              |
| “ maximum diameter,                     | . . . . . | 64 “               |
| “ minimum “                             | . . . . . | 34 “               |
| “ length of elliptical chamber of bore, | . . . . . | 15 “               |

The trunnions were set over the centre of gravity of the gun.

All of the calculations of weights and centre of gravity, made by Major Rodman, and verified here, proved from the results to have been extremely accurate.

The iron used was all made in Blair County, Pennsylvania, and was the best quality of warm blast charcoal pig, remelted once into second fusion pigs, from which, the gun was made.

Specimens from the head gave a density of 7.31 and a tenacity of 36,000 pounds per square inch. A specimen from the breech journal gave a density of 7.3715 and tenacity of 43,746 pounds per square inch. The density is taken with distilled water, and reduced to the common comparative standard of 60° F.

The cost was about \$32,000; others could be made much cheaper.

From the commencement of the first preparations to the completion of the recent trial at Fort Hamilton, New York, not a single error or mishap has occurred, to mar the complete success of this last enormous stride in advance of all experience in Artillery.

Letters were received from Professor Zantedeschi, dated Padua, September 11th and November 7th, 1864, a translation of one of which was read, as follows :

I have the honor to forward to your honorable Society, a copy of my letters on the origin of the dew and of the hoarfrost. I here briefly sum up the principal heads of my observations. Can these, my sheets, be published in the Transactions of the Society, my studies may gain such notice, that physicists on the virgin soil of America may repeat my experiments. Remote from the polemics, I confine myself to the fundamental facts of science.

The mode of the manifestation of the dew and the hoarfrost ; its sublimation from the soil, from the hour next the setting sun up to the following morning, in the hour next the sunrise, which is the hour of greatest cold, was the subject of my first series of experiments ; the circumstances which accompany these phenomena (meteora) were diligently examined in all the calm and serene nights, in which in Italy and in the environs of Paris I made my observations. I find that there is a limit, beyond which dew and hoarfrost is not sensible ; and that the limit varies with the variations of the grade of humidity and temperature of the air.

With comparative experiments I have determined whence proceed the aqueous vapor necessary to form dew and hoarfrost. It comes neither wholly from the air by refrigeration, nor wholly from the earth. The greater part rises from the earth, to which is added afterwards, some from the supersaturation of the air ; and, it ought not to be forgotten, some from evaporation from the leaves of plants, which is in least quantity. The mean relative humidity of the garden, in which I made my observations, was 55 degrees of the Hygrometer of Saussure. The Hygrometer which received the humidity of the air alone, never rose during the hour of greatest cold to 70° ; the Hygrometer which received the moisture from the air and from the earth, went up to 95° ; and the Hygrometer which received the moisture from the earth and from the leaves of some small plants, reached the maximum of humidity, 109°. In this way I discovered that the relative humidity of the air was 50°, that of the earth 25° ; that of the evaporation of the leaves of plants 5°. These numbers are not absolute. They will vary with the various circumstances of the atmosphere ; those of temperature of relative humidity, in nights continually calm and serene ; but in all circumstances the abundance of aqueous vapor coming from the earth, was

always greater, than that from the supersaturation of the air; and that from the evaporation from plants was always less. The experiment seems entirely new and decisive.

I studied with repeated and laborious experiments to determine the source of the cold necessary for condensing the aqueous vapor forming dew and hoarfrost. By comparative observations I have convinced myself, that the frost of the air precedes that of the moist solids, and that the moist solids do not chill below the temperature of the circumstanding air, taken at the mean height, always in calm and serene nights. It was made apparent by my vertical balance Anemoscope that the nocturnal frost derived itself from the column of cold descending air. I recognized the fact that the surface of the soil, and even of the snow covering it, is always colder than the stratum of air above it; and that with every departure from this stratum the temperature of the air is increased. In all these *facts*, I have done justice to all the physicists who have preceded me, and I register that which is granted to my observations and experiments from my friends.

I have not forgotten to verify the influence exerted by electricity on the deposition of aqueous vapor on solids. I finish these my letters, with two useful applications to Agriculture and to Hygiene, always under guidance of history and experience.

I beg physicists living in the open country in serene and calm nights to repeat all these observations, which complete the theory of the dew and the hoarfrost. May this, my request, obtain favor from your honorable Society, to which, I declare myself with the highest esteem and perfect observance,

ZANTEDESCHI.

PADOVA, September 11th, 1864.

An enamelled portrait of a French gentleman, concealed in the bottom of an inkstand or wafer-box, and thrown out by the workmen in digging the foundation for an enlargement of a house, originally built in 1785, at Valley Forge (the headquarters of General Washington, in the winter of 1776), was exhibited to the members by Mr. T. P. James. The relic is, apparently, a work of art of the age of Louis XVI; and much pains has been fruitlessly expended for its identification, both in Europe and in this country.

Mr. Dubois placed before the Society, specimens of Magnesium, lately procured from London for the Cabinet of the Mint, and for experiment.

Magnesium wire is not an entirely new article in this country; but perhaps the ingot is so, and is especially curious. Of all the metals which remain fixed in open air, this is the lightest; the sp. gr. being 1.70, or less than one-twelfth that of platinum, which stands at the other extreme of the scale (and of which a specimen weighing one-third more than the magnesium, is shown for comparison).

This metal is now readily manufactured in England, by a process patented in 1863, and is sold in London at a price equal to \$5.25 in gold, per ounce, av'd. Its physical properties are such as to give little promise of utility, except for the purpose of illumination. A wire of this metal, held in an ordinary flame, ignites and burns with a dazzling brilliancy, giving out a white light. On this account it is used in photography, to take pictures at night, or in places where the sun cannot penetrate. The wire appears ductile and pliable, but has really not much tenacity, and snaps off when bent around to the horseshoe shape. It is, in fact, not formed by rolling and drawing, but by the hydrostatic press, from the solid cake; somewhat as lead pipe is made. This specimen has a diameter of one-sixtieth of an inch. One hundred inches of such wire will weigh about fifteen grains, and would cost eighteen cents (gold) in London, at the rate above stated.

The metal being too brittle to be cut with a chisel, this piece of ingot, as will be seen, has been detached by sawing.

Mr. Eckfeldt has made a pretty full examination of its chemical properties, which will here be briefly summed up.

It is slightly soluble in sulphuric acid of commercial strength; the action is violent when the acid is diluted.

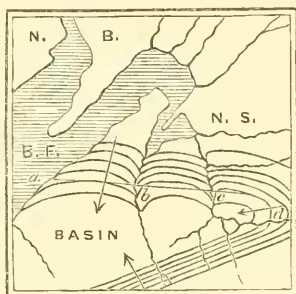
The solution is active and complete in nitric and muriatic acids of ordinary strength.

It is also dissolved by the vegetable acids, such as the acetic and tartaric, but slowly by the oxalic. In a solution of carbonate of soda it dissolves very slowly, but more actively with heat, when it is converted into a carbonate. In caustic potassa there is no action.

It is not affected by water, either at 60° F. or at the boiling-point, except to produce a slight tarnish. The water, however, is decomposed by it. Moist air makes a slight oxidation. These specimens came across the ocean, however, in a paper box, without losing the metallic lustre.

The Librarian communicated an extract from a letter of Mr. W. A. Hendry, of the Crown Land Office, at Halifax, respecting the discovery of a large bed of coal among the lean beds of the Joggins and Albert Mine regions :

“No new discoveries have been made, since you were here, except perhaps at the Spring Hill, which I visited two months ago. You recollect its position on the map. A discovery has been made of a seam of coal, said to be 16 feet thick. I myself measured nearly 14 feet; but 16 and 18 feet has been currently reported as the thickness of the great coal-seam of Spring Hill. The bed, with thin clay partings, gives from 12 to 14 feet of good bituminous coal. I am well acquainted with the gentlemen who are geologists there, Messrs. Mills & Sherer.” It is well known that of more than a hundred coal-beds outcropping among these measures on the coast of the Joggins, not one is much more than 4 feet. It is noticeable that this large increase in the size of one of these beds, that at Spring Hill, takes place at the head of a synclinal axis, towards the east, as shown in the diagram.



- B. F. Bay of Fundy.
- N. B. New Brunswick.
- N. S. Nova Scotia.
- a. The Joggins Mines.
- b. The Victoria Mines.
- c. The Macan Mines.
- d. The Spring Hill Mine.

The following summary of the rocks passed through in an old salt boring in Clearfield County, Pennsylvania, was communicated by the Librarian, from a letter from Mr. John M. Hale, of Reading. The Librarian remarked, in offering the section, that, it was one of the most useful duties of learned Societies to obtain, and place on record, the too easily lost or destroyed results of the labors of the past.

“Some twenty-five years since, a company bored for Salt Water, at the junction of the Beaver Dam and Eastern branches of the Clearfield Creek, where a natural salt lick existed, and employed Mr. S. G. Wilson to superintend the operations; and to him I am indebted for a copy of his notes, a synopsis of which I thought might be interesting to you, if you have not seen them.



"The first 23 feet was through the clay, where the rock was struck, 7 feet of which was black slate, followed by 6 inches of Bituminous Coal. At a depth of 32 feet, 6 inches, a vein of fire brick rock was struck, which was 13 feet in thickness, and which appeared in the lower part of the vein to be mixed with Iron Ore. The next 5 feet, of black slate mixed in with coal, followed by 1 foot of white flint rock, then 2 feet, 6 inches, of black slate, when a vein of Cannel Coal was struck. This was at a depth of 53 feet. Next, 8 inches of slate, which separated the Cannel Coal from a vein of bituminous coal, 4 feet, 4 inches, in thickness. Then 14 feet of common sandstone, and 2 feet mixed with slate and coal. Then a vein 60 feet in thickness of Porcelain Clay, of a very superior quality, resembling white lead, ground in oil. The next 135 feet was through common sandstone, changing in color from brown to black, and mixed with quartz. Again the auger passed through a vein of 5 feet of Porcelain Clay. The balance was through a vein of hard sandstone, a portion of which was mixed with a yellow metal, which was believed to be copper. Unfortunately, the only specimen saved by Mr. Wilson, was lost. Was it Iron Pyrites?

"At the depth of 548 feet, salt water was reached, but so mixed with a dark fluid that it was believed to be useless. Was this dark fluid Petroleum?

"The veins of coal may be the same as those at Oseola, or the one at Philipsburg passed through at a depth of 199 feet."

Mr. Peale took this occasion to exhibit to the Society some fragments of ancient vessels of pottery of large size, and still conserving the impressions of the osier wickerwork baskets, by which they were ornamented. They were found at ancient salt springs in Gallatin County, Illinois, and are made of clay, in which remain visible fragments of fresh-water shells, mixed in to strengthen the clay.

Large quantities of comminuted shells and broken pottery remain near the springs, with other evidences of ancient salt works, of which there is now no knowledge, either recorded or traditionary.

The style of the ornamentation is entirely distinct from that of the Indian pottery of recent date, and the vessels much larger than any made by that race. The inference drawn from these facts is, that they are the reliquæ of the Mound Builders, a race much more advanced in the arts than those which succeeded them.\*

\* [These fresh-water shells are brought up in evidence by Mr. Winchell, in his

Mr. Lesley announced the discovery, just made, of a remarkable lignite deposit, close to the ore-banks of the M<sup>ont</sup> Alto Furnace, in Franklin County, Pennsylvania; but owing to the lateness of the hour, begged leave to postpone the exhibition of the specimens on the table, and the description of the deposit, to the next meeting.

The stated business of the meeting being called for, the Treasurer's report was read, and regularly referred to the Finance Committee.

The report of the Publication Committee was read, and referred to the Finance Committee.

The report of the Board of Officers on the application of "Torricelli" for the Magellanic premium was read, and, on motion of Mr. Fraley, it was resolved, that the subject be ordered for discussion at the next meeting of the Society, and that notice be given to the members on the cards, and an advertisement be made for three days before the meeting, in two daily newspapers.

New nomination No. 529 was read.

And the Society was adjourned.

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*Stated Meeting, December 16th, 1864.*

Present, twenty-one members.

Dr. WOOD, President, in the Chair.

A letter declining the appointment to prepare an obituary notice of Prof. Silliman, was received from Prof. Pierce, dated Cambridge, December 18th, 1864.

lately published paper on the structure of the prairies; wherein he argues that the prairie deposit was made in a preglacial lake, overspreading the whole Valley of the Mississippi, as far south as Middle Alabama. *Sill. Jour.*, Nov., 1864. Sec.]